

# SAC3945A

GaAs MMIC Driver Amplifier  
18~45GHz 23dBm

Rev1.0

## Features

- Frequency: 18~45GHz
- Gain: 15dB
- Output P<sub>-1dB</sub>: 25dBm
- Output IM<sub>3</sub>: -23dBc Typ.
- Supply Voltage: +5V/-Vg
- Balanced Amplifier
- Full Passivation for Enhanced Reliability
- Die Size: 2.3mm×1.24mm×0.1mm

## General Description

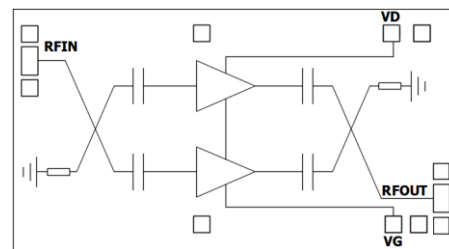
SAC3945A is a balanced GaAs MMIC driver amplifier, which operates between in 18~45GHz. SAC3945A provides 15dB of small signal gain, and 25dBm of output P<sub>-1dB</sub> while requiring 450mA from a +5V supply voltage

The chip offers full passivation for increased reliability and moisture protection

## Typical Applications

- Point-to-Point Radios
- SATCOM
- Military and Space
- Test and Measurement
- Radar

## Functional Diagram



## Electrical Performance

TA=25°C, V<sub>D</sub>=+5V, I<sub>D</sub>=450mA, Z<sub>0</sub>=50Ω

Parameter	Min.	Typ.	Max.	Units
Frequency Range	18~45			GHz
Small Signal Gain	12	15	23	dB
Small Signal Gain Flatness	—	±1.5	±2	dB
Reverse Isolation	—	-35	—	dB
Input/ Output VSWR	—	1.35	2.5	:1
Noise Figure	—	10	—	dB
Output Power for 1 dB Compression (OP <sub>-1dB</sub> )	22	25	—	dBm
Output IM <sub>3</sub>	—	-23*	—	dBc
Supply Current (I <sub>D</sub> )	—	450**	550	mA
Drain Voltage (V <sub>D</sub> )	5	—	6	V
Thermal Resistance	22			°C/W

\* Pout/Tone=17dBm, Fc=38GHz, Δf=10MHz

\*\* Adjust Vg between -1V to -0.4V to achieve I<sub>D</sub>= 450 mA typical.

## Absolute Maximum Ratings

Maximum Input Power	+13dBm , CW 1min	Operating Temperature	-55°C~+85°C
Channel Temperature	+150°C	Storage Temperature	-55°C~+150°C
Maximum V <sub>D</sub>	6.5V		

## SuperApex, LLC

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# SAC3945A



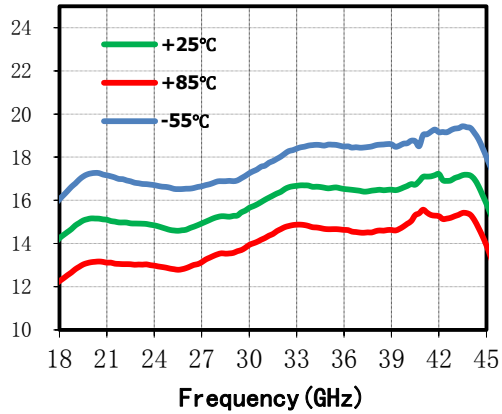
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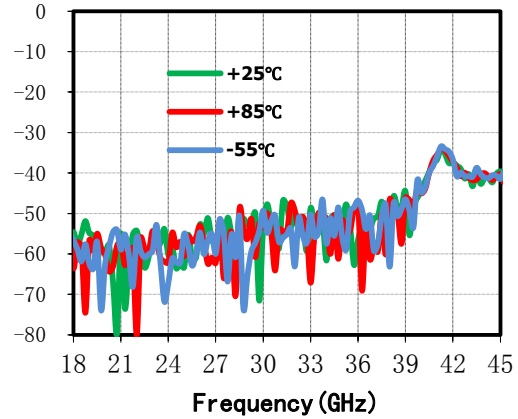
## Typical Small Signal Performance Curve

$V_D=+5V$ ,  $I_{DQ}=450mA$ , the following curves are taken from SAC3945A evaluation board.

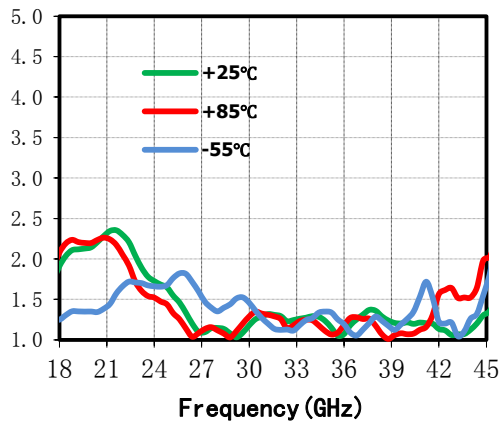
Small Signal Gain(dB) vs. Temperature



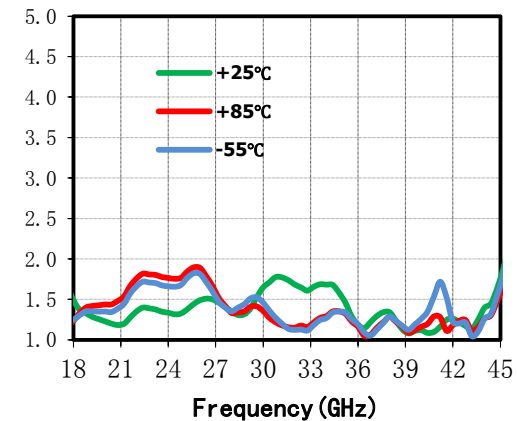
Isolation(dB) vs. Temperature



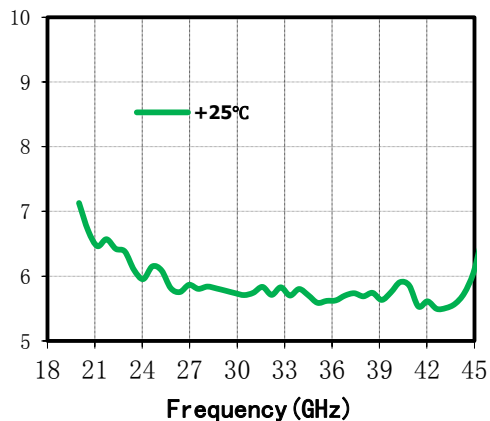
Input VSWR(:1) vs. Temperature



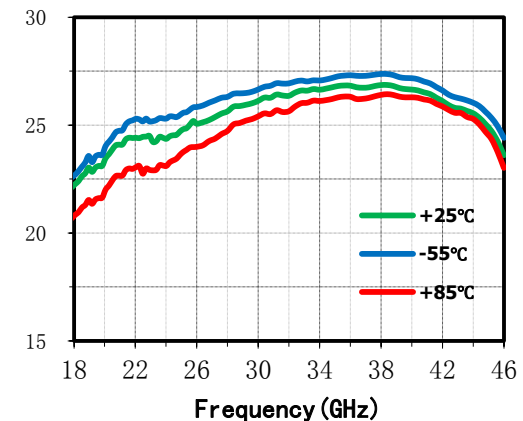
Output VSWR(:1) vs. Temperature



Noise Figure(dB) vs. Frequency



OP-1dB (dBm) vs. Temperature



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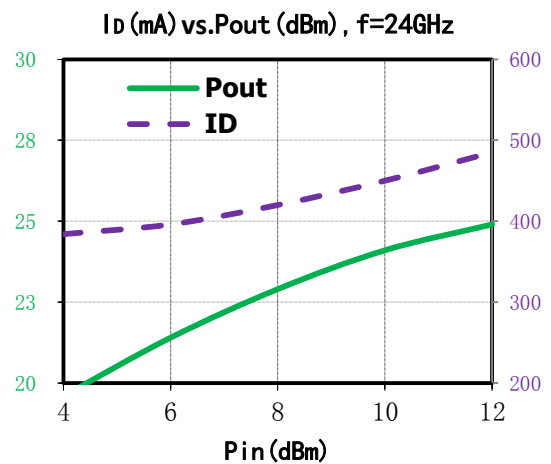
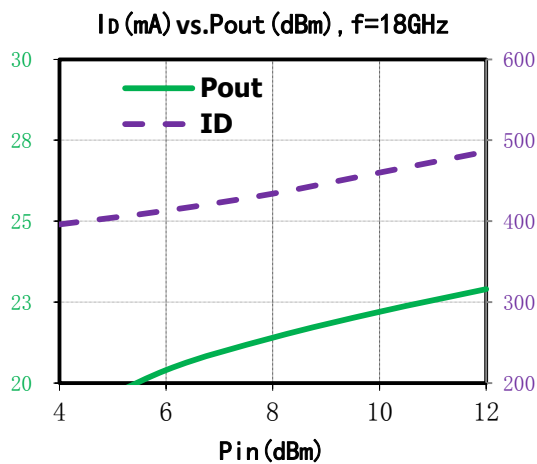
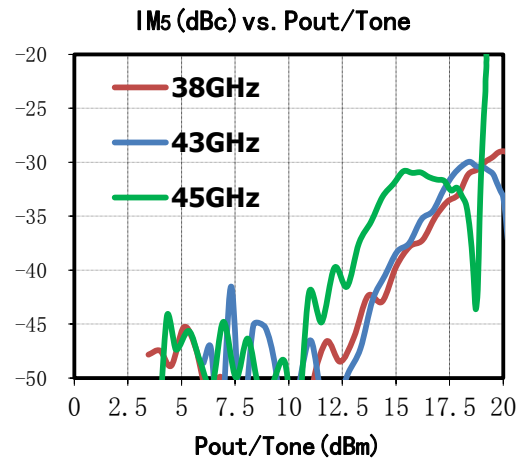
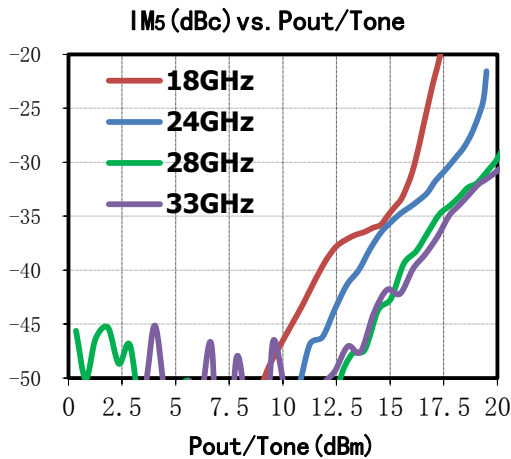
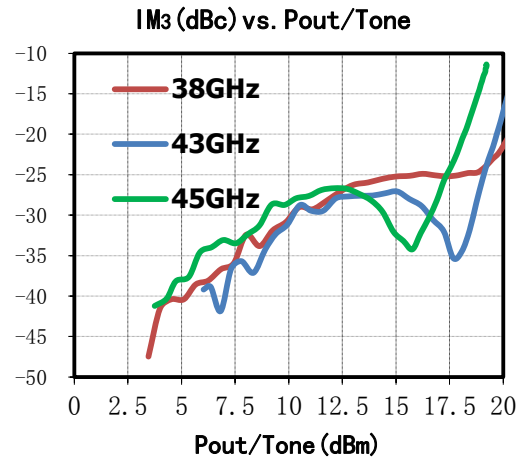
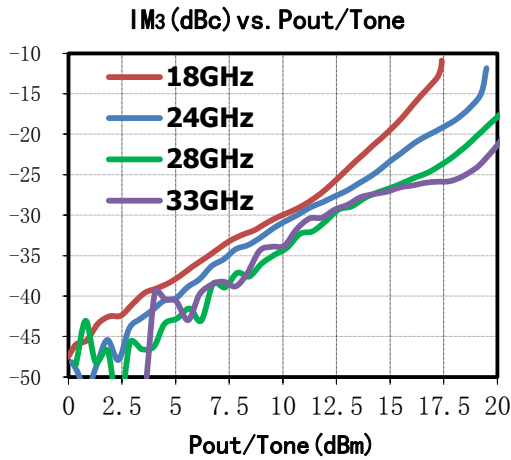
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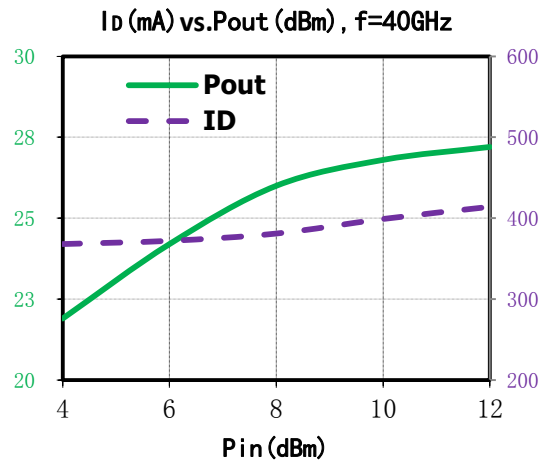
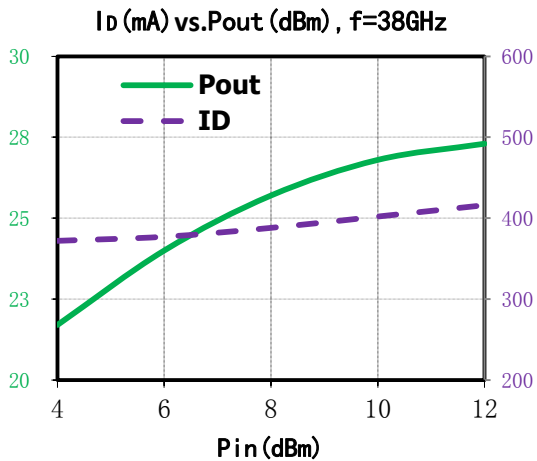
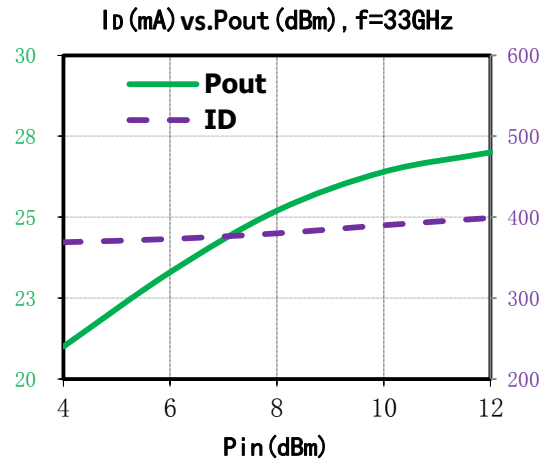
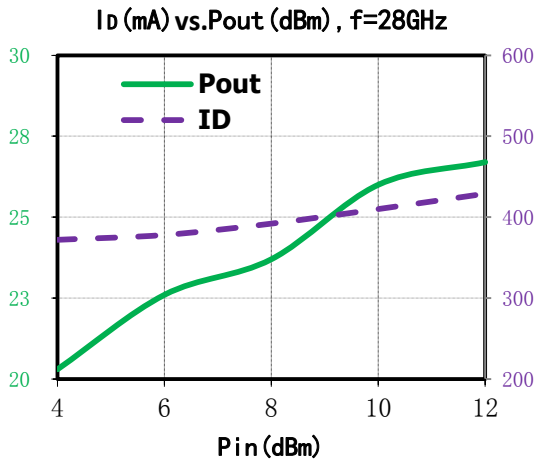
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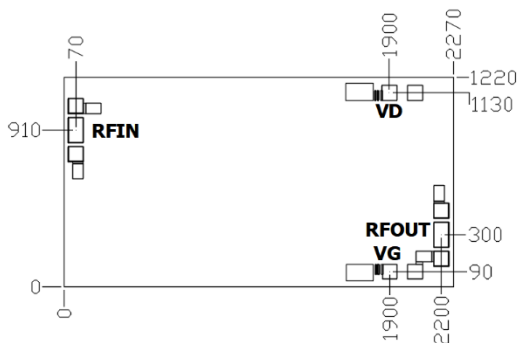


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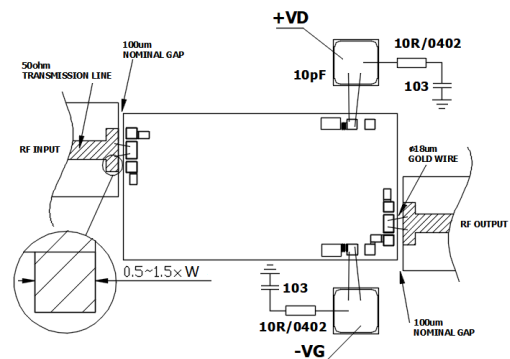
## Die Outline ( $\mu\text{m}$ )



RFIN, RFOUT pads size:  $130 \times 90 \mu\text{m}^2$

VG/VD pads size:  $90 \times 90 \mu\text{m}^2$

## Assembly Diagram



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## Notes

1. SAC3945A is biased with a positive drain supply and negative gate supply. The recommended gate voltage is set to -0.4 to -1V when the drain voltage is set to 5V.
2. The back of chip is RF ground.
3. RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 0.8 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized.
4. Bypass SLCs should be placed as close as possible to the chip.
5. GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

## Revision History

Revision	Date	Comment
1.0	Oct. 2021	First Release

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